



[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 430

[Docket No. EERE-2010-BT-NOA-0067]

RIN: 1904-AC52

Energy Conservation Standards for Set-Top Boxes: Availability of Initial Analysis

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of data availability (NODA).

SUMMARY: The U.S. Department of Energy (DOE) has completed an initial analysis that estimates the potential economic impacts and energy savings that could result from promulgating a regulatory energy conservation standard for set-top boxes. At this time, DOE is not proposing any energy conservation standard for set-top boxes. However, it is publishing this initial analysis so stakeholders can review the analysis's output and the underlining assumptions and calculations that might ultimately support a proposed standard. DOE encourages stakeholders to provide any additional data or information that

may improve the analysis. The analysis is now publically available at:

http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/33.

ADDRESSES: The docket, EERE-20111-BT-NOA-0067, is available for review at www.regulations.gov, including Federal Register notices, comments, and other supporting documents/materials. All documents in the docket are listed in the www.regulations.gov index. However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

A link to the docket web page can be found at:

<http://www.regulations.gov/#!docketDetail;D=EERE-2011-BT-NOA-0067>. The regulations.gov web page contains instructions on how to access all documents in the docket, including public comments.

For further information on how to review the docket, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

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I. History of Energy Conservation Standards Rulemaking for Set-Top Boxes

Under the authority established in Title III, Part B¹ of the Energy Policy and Conservation Act of 1975, as amended, (EPCA or the Act),² Pub. L. 94-163 (42 U.S.C. 6291-6309, as codified), DOE published a notice of proposed determination that tentatively determined that set-top boxes and network equipment qualify as a covered product because classifying products of such type as a covered product is necessary or appropriate to carry out the purposes of EPCA, and the average U.S. household energy use for set-top boxes and network equipment is likely to exceed 100 kilowatt-hours (kWh) per year. 76 FR 34914 (June 15, 2011).

DOE then prepared a document titled “Rulemaking Overview and Preliminary Market and Technical Assessment: Energy Efficiency Program for Consumer Products:

¹ For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

² All references to EPCA in this document refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (Dec. 18, 2012)

Set-Top Boxes and Network Equipment” (Rulemaking Overview), which describes an initial market and technical analysis as well as the procedural and analytical approaches DOE anticipates using to evaluate potential energy conservation standards for set-top boxes.³

DOE also published a Request for Information (RFI) on December 16, 2011, requesting feedback from interested parties on several topics related to test procedures and potential energy conservation standards for set-top boxes. 76 FR 78174.

DOE held a public meeting on January 26, 2012, at which it described the various analyses DOE would conduct as part of the rulemaking, such as the engineering analysis, the manufacturer impact analysis (MIA), the life-cycle cost (LCC) and payback period (PBP) analyses, and the national impact analysis (NIA). DOE also discussed questions raised in the RFI and solicited feedback from stakeholders. Representatives for manufacturers, trade associations, environmental and energy efficiency advocates, and other interested parties attended the meeting.⁴ Comments received since publication of the Rulemaking Overview and RFI have helped DOE identify and resolve issues related to the initial analyses.

In May 2012, DOE received a request from set-top box manufacturers, video programming distributors, and energy efficiency advocates to suspend its rulemaking activities to allow these stakeholders time to negotiate a non-regulatory agreement to

³ This document is available at: <http://www.regulations.gov/#!docketDetail;D=EERE-2011-BT-NOA-0067>.

⁴ Supporting documents from this public meeting, including presentation slides and meeting transcript, are available at: <http://www.regulations.gov/#!docketDetail;D=EERE-2011-BT-NOA-0067>.

improve the efficiency of set-top boxes in lieu of a federal regulatory standard.⁵ These stakeholders cited several reasons why a non-regulatory agreement is preferable to a federal standard, including the ability to have an agreement come into effect sooner, the additional savings born of updating set-top boxes already in the field via software downloads, and the flexibility this industry requires given the rapid cycles of innovation and the complexity of networks. Following this meeting, DOE suspended the issuance of a proposed rule for an energy conservation standard or test procedure until after October 1, 2012 to allow industry representatives and energy efficiency advocates time to negotiate a non-regulatory agreement to improve the energy efficiency of set-top boxes.

During this time, DOE continued testing and evaluating the energy efficiency of set-top boxes in support of developing a DOE test procedure. Though DOE suspended the issuance of any new proposal, DOE continued developing an analysis in preparation for a regulatory standard in the event a non-regulatory agreement could not be reached or to cover any class of set-top boxes not covered by a non-regulatory agreement.

Despite the participants' best efforts to negotiate a non-regulatory agreement, these talks ultimately did not produce an agreement that was supported by all parties, and the negotiations were terminated.⁶ Following the negotiations with energy efficiency advocacy groups, industry representatives signed and announced an agreement amongst themselves to improve the efficiency of set-top boxes. The five-year industry agreement, signed on December 6, 2012 between 15 video programming distributors and set-top box

⁵ Ex Parte communication between DOE and stakeholders available at: <http://www.regulations.gov/#!documentDetail;D=EERE-2011-BT-NOA-0067-0037>

⁶ See Joint Letter to Secretary Chu, signed November 1, 2012, available at: <http://www.regulations.gov/#!documentDetail;D=EERE-2011-BT-NOA-0067-0041>

manufacturers, went into effect on January 1, 2013.⁷ DOE has since moved forward with the regulatory process. On January 23, 2013, DOE published a notice of proposed rulemaking (NOPR) for a set-top box test procedure. 78 FR 5075.

II. Current Status

The analysis tools described in this NODA were developed to support a potential energy conservation standard for set-top boxes. DOE's primary goal is to improve the efficiency of consumer products, which result in significant national energy savings, consumer utility bill savings, and greenhouse gas emission reductions. DOE recognizes that there are multiple paths forward to reach this goal. At this time, DOE intends to move forward with its traditional regulatory rulemaking activities to develop an energy conservation standard for set-top boxes. The initial analysis presented in today's notice is a step in this process. However, as part of the regulatory impact analysis performed for a NOPR proposing an energy conservation standard, DOE will consider any non-regulatory agreement reached between all stakeholders as an alternative to a regulatory standard.

At this time, DOE is not proposing any energy conservation standards for set-top boxes, and is therefore not requesting comments on any proposal at this time. If DOE issues a NOPR proposing new energy conservation standards, stakeholders will have an opportunity to provide statements on the record at a public meeting and to also submit written comments. DOE may revise the analysis presented in today's NODA based on

⁷ Full text of the industry voluntary agreement is available at:
http://www.ace.org/CorporateSite/media/ce_news/FINAL-PUBLIC-VOLUNTARY-AGREEMENT-%2812-6-2012%29.pdf

any new or updated information or data it obtains between now and the publication of any future NOPR proposing energy conservation standards for set-top boxes. DOE encourages stakeholders to provide any additional data or information that may improve the analysis.

III. Summary of the Analyses Performed by DOE

DOE conducted initial analyses of set-top boxes in the following areas: (1) engineering; (2) manufacturer impacts; (3) life-cycle cost and payback period; and (4) national impacts. The tools used in preparing these analyses (engineering, life-cycle cost, national impacts, and manufacturer impacts spreadsheets) and their respective results are available at:

http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/33⁸.

Each individual spreadsheet includes an introduction describing the various inputs and outputs to the analysis, as well as operation instructions. A brief description of each of these 4 analysis tools is provided below. If DOE proposes an energy conservation standard for set-top boxes, then DOE will also publish a Technical Support Document (TSD), which will contain a detailed written account of the analyses performed.

⁸These spreadsheets are also available on the rulemaking docket at <http://www.regulations.gov/#!docketDetail;D=EERE-2011-BT-NOA-0067>

A. Engineering Analysis

The engineering analysis establishes the relationship between the cost and efficiency levels of set-top boxes. This relationship serves as the basis for cost-benefit calculations performed in the other three analysis tools for individual consumers, manufacturers, and the Nation.

As a first step in the engineering analysis, DOE established 17 potential set-top box groupings based on a characterization of the relevant set-top box markets. For each of these groupings, DOE identified existing technology options, including prototype designs that could improve the energy efficiency of set-top boxes. DOE then reviewed each technology option to decide whether it is technologically feasible; is practicable to manufacture, install, and service; would adversely affect product utility or product availability; or would have adverse impacts on health and safety. The engineering analysis identifies representative baseline products, which is the starting point for analyzing technologies that provide energy efficiency improvements. “Baseline product” refers to a model or models having features and technologies typically found in minimally-efficient products currently available on the market. DOE modeled the power consumption of baseline products in on and sleep modes of operation by system level components (e.g., tuners, hard disk, processor, power supply, etc.). DOE then identified design options to improve the efficiency of STBs and considered these options in the analysis as candidate standard levels (CSLs). DOE estimated the manufacturer production costs for the baseline and each of the three CSLs. The manufacturer production costs were derived from product teardowns, using more efficient components

and modeling efficiency savings from power scaling when components are not in use. The main outputs of the engineering analysis are the manufacturer production costs (including material, labor, and overhead) and power consumption in each mode of operation at the baseline and each of 3 CSLs for all 17 possible groupings of set-top boxes.

B. Manufacturer Impact Analysis

For the MIA, DOE used the Government Regulatory Impact Model (GRIM) to assess the economic impact of potential standards on set-top box manufacturers and multichannel video programming distributors. DOE developed key industry average financial parameters for the GRIM using publicly available data from corporate annual reports along with information received through confidential interviews with manufacturers and industry representatives. Additionally, DOE used this and other publicly available information to estimate and account for the aggregate industry investment in research and development required to produce compliant products at each efficiency level.

The GRIM uses this information in conjunction with inputs from other analyses including manufacturer production costs from the engineering analysis, and shipments and price trends from the NIA to model industry annual cash flows from the base year through the end of the analysis period. The primary quantitative output of this model is the industry net present value (INPV), which DOE calculates as the sum of industry cash

flows, discounted to the present day using industry specific weighted average costs of capital.

Standards can affect INPV in several ways including increasing the cost of production and impacting manufacturer markups, as well as requiring upfront investments in manufacturing capital and product development. Under potential standards for set-top boxes, DOE expects that manufacturers and video programming distributors may lose a portion of the INPV, which is calculated as the difference between INPV in the base-case (absent new energy conservation standards) and in the standards-case (with new energy conservation standards in effect). DOE examines a range of possible impacts on industry by modeling scenarios with various standard levels and pricing strategies.

In addition to INPV, the MIA also calculates the manufacturer markups, which are applied to the engineering cost estimates to arrive at the manufacturer selling price. For efficiency levels that require extensive software development, DOE calibrated the manufacturer markups to allow for the recovery of this upfront cost by amortizing the investment over the units shipped in the first three years of the analysis period. Due to the complexities of video programming distributor pricing models, DOE simplified its assumption regarding markups from the video programming distributor to the consumer by assuming that the incremental cost of a more efficient set-top box is directly passed on to the consumer. The resulting selling prices are then used in the LCC and PBP analyses, as well as in the NIA.

C. Life-Cycle Cost and Payback Period Analyses

The LCC and PBP analyses determine the economic impact of potential standards on individual consumers. The LCC is the total cost of purchasing, installing and operating a set-top box over the course of its lifetime. The LCC analysis compares the LCC of a set-top box designed to meet possible energy conservation standards with the LCC of a set-top box likely to be installed in the absence of standards. DOE determines LCCs by considering: (1) total installed cost to the consumer (which consists of manufacturer selling price, distribution chain markups, and sales taxes); (2) the range of annual energy consumption of set-top boxes that meet each of the efficiency levels considered as they are used in the field; (3) the operating cost of set-top boxes (e.g., energy cost); (4) set-top box lifetime; and (5) a discount rate that reflects the real consumer cost of capital and puts the LCC in present-value terms. The PBP represents the number of years needed to recover the increase in purchase price of higher-efficiency set-top boxes through savings in the operating cost. PBP is calculated by dividing the incremental increase in installed cost of the higher efficiency product, compared to the baseline product, by the annual savings in operating costs.

For set-top boxes, DOE determined the range in annual energy consumption using outputs from the engineering analysis (power consumption at each efficiency level) and from a representative field-metered sample of television usage (both live broadcast and DVR viewing). Total installed costs at each CSL are outputs from the MIA. Recognizing that several inputs to the determination of consumer LCC and PBP are either variable or uncertain (e.g., annual energy consumption, product lifetime, electricity price, discount

rate), DOE conducts the LCC and PBP analysis by modeling both the uncertainty and variability in the inputs using Monte Carlo simulation and probability distributions.

The primary outputs of the LCC and PBP analyses are: (1) average LCCs; (2) median PBPs; and (3) the percentage of households that experience a net benefit, have no impact, or have a net cost for each potential set-top box grouping and efficiency level. The average annual energy consumption derived in the LCC analysis is used as an input in the NIA.

D. National Impact Analysis

The NIA estimates the national energy savings (NES) and the net present value (NPV) of total consumer costs and savings expected to result from potential new standards at each CSL. DOE calculated NES and NPV for each CSL as the difference between a base-case forecast (without new standards) and the standards-case forecast (with standards). Cumulative energy savings are the sum of the annual NES determined for the lifetime of set-top boxes shipped during the analysis period. Energy savings include the full-fuel cycle energy savings (i.e., the energy needed to extract, process, and deliver primary fuel sources such as coal and natural gas, and the conversion and distribution losses of generating electricity from those fuel sources). The NPV is the sum over time of the discounted net savings each year, which consists of the difference between total operating cost savings and increases in total installed costs. NPV results are reported for discount rates of 3%, 5%, and 7%.

To calculate the NES and NPV, DOE projected future shipments and efficiency distributions (for each CSL) for each potential set-top box grouping. DOE recognizes the uncertainty in projecting shipments and efficiency distributions, and as a result the NIA includes several different scenarios for each. Other inputs to the NIA include the estimated set-top box lifetime used in the LCC analysis, manufacturer selling prices from the MIA, and average annual energy consumption from the LCC.

The purpose of this NODA is to notify industry, manufacturers, consumer groups, efficiency advocates, government agencies, and other stakeholders of the publication of the initial analysis of potential energy conservation standards for set-top boxes.

Stakeholders should contact DOE for any additional information pertaining to the analyses performed for this NODA.

Issued in Washington, DC, on February 28, 2013.

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[FR Doc. 2013-05344 Filed 03/06/2013 at 8:45 am; Publication Date: 03/07/2013]